

Cut Kale - A Blooming Success

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Cutflower kale (*Brassica oleracea*) is still a novelty to most U.S. cut flower growers, but breeders and European florists are touting the versatility of this unique cut. Popular cultivars include 'Sunset' (pinkish-red), 'Sunrise' (creamy white), and 'White Crane' (a hybrid between pink and white). Because kales mature in autumn, they provide diversity to late-season arrangements. Retail prices for cut kale range from \$1.50 to \$2.50 per stem, and storage and vase life are reported to be excellent. Because this type of cut flower has great potential for North Carolina, we conducted field research in the fall of 2001 and 2002.

Production Schedule

Cut kale needs about 75 days of growth before cool temperatures begin. In North Carolina, this means that seed should be sown around 21 June. We recommend using a germination mix with excellent water holding capacity in 105 or 128-cell plug trays. Recommended germination temperatures are 70-75°F. After 2 to 3 weeks, plugs should be transplanted into large cell packs (72-cell or larger) or pots. We used

5-inch pots, but this may mean lower profitability due to increased time in the greenhouse, and plants this large will need to be staked. Transplanting smaller plants to the field will require more attention to irrigation, however. Ginny Kristl, a grower at Johnny's Selected Seeds in Maine, transplanted 105-plugs directly to the field, but this would be very difficult to do in North Carolina because of the potential for heat and water stress which can occur during our summers.

Transplanting to the field should occur no later than the second week of August. This provides enough time for stem elongation, since growth generally slows down with the onset of cool night temperatures (below 60°F). Coloration of the upper-central leaves occurs when cool temperatures break down chlorophyll and allow the white, pink, or red color to be expressed.

Because transplanting occurs later in the summer, irrigation must be provided. Insufficient moisture will cause shorter stems and leaf drop. Drip tape is recommended for field production of most cut flowers because it decreases the occurrence of Botrytis and conserves water.

Netting or staking is necessary for straight stems. We staked the plants while they were in pots in the greenhouse, then used netting in the field. One row of netting is sufficient, and this can be pulled up as the plants grow. Lower leaves should be removed periodically during growth, which makes netting and insect control easier. Most netting designed for cut flowers is on a 6x6-inch grid, so plant spacing should match the netting grid size.

More on Stem Length

One of the major concerns with cut kale is how to produce long, straight stems. Mature height of cut kale is reported to be 24 inches. In trials conducted at NC State in 2001, stem height ranged from 9 to 23 inches, with 16 inches being the average stem length when plants were placed at the recommended 6x6-



Figure 1. The large heads of cut kale add instant impact to any bouquet.



Figure 2. Cut kale plots during the growing (left) and harvesting (right) stages.

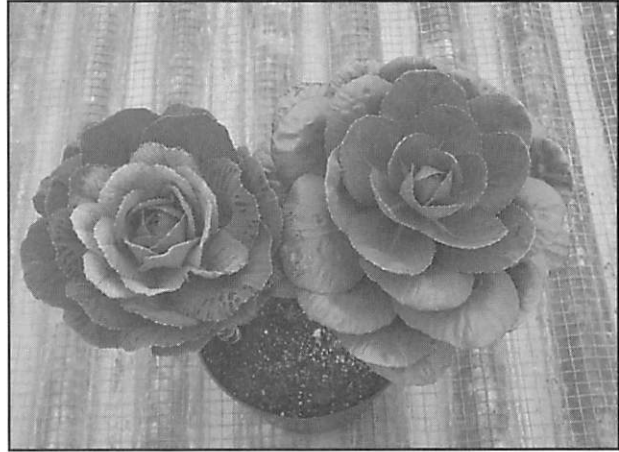


Figure 3. Without cool night temperatures (below 60°F), cut kale cannot develop its characteristic bloom of color in the central leaves. The stem on the right was produced in a greenhouse.

- inch spacing. We saw slightly increased stem length with 8x8-inch plant spacing (avg. = 19 inches), and decreased stem length with 4x4-inch spacing (avg. = 14 inches).

In 2002, we sought to increase stem length by applying gibberellic acid (GA) to plants. GA is a plant hormone that is responsible for cell elongation. We tested 10, 20, 40, 80, and 100 ppm GA (Pro-Gibb, Valent Chemical Corp.). Height, color quality, and overall visual plant quality were not affected by any concentration of GA. However, we do not feel that the summer of 2002 was typical for North Carolina, which experienced the worst drought in recent memory. Additionally, the field where the kale was grown was infested with *Pythium*, so we saw more damage from root rot than would normally be

experienced. To compound these problems, or perhaps, because of them, we experienced extremely heavy pressure from insects, particularly cabbage loopers. Furthermore, we feel that the efficacy of GA would have been greatly enhanced by the addition of a surfactant. Kale leaves are very thick and waxy and thus repel water. A surfactant would break this surface tension and allow the GA to be absorbed by the plant. Capsil (Scotts Co., Marysville, Ohio), a spray adjuvant, has been shown to improve uptake of plant growth regulators (Peter Konjoian, personal communication) and may prove beneficial for cut kale.

Fertilization

Containerized plants should receive fertilizer at the nitrogen (N) rate of 100-150 ppm, constant liquid ►



Figure 4. Long, straight stems are a goal of cut kale production.



Figure 5. Fully colored, mature stems of 'Sunrise' show pink, red, and purple hues.

- feed. Broadcast ammonium nitrate at the N rate of 150-200 ppm to the field before transplanting seedlings. For more specific recommendations on nutrition, see Success with Ornamental Cabbage and Kale (HIL #507) at http://www.ces.ncsu.edu/depts/hort/floriculture/crop/crop_kale.htm.

Pest Management

The primary pests of cut kale are cabbage loopers and imported cabbageworms, both caterpillars that can be controlled with *Bacillus thuringiensis* (Dipel), azadirachtin (Azatin), permethrin (Astro), or carbaryl (Sevin). Refer to Success with Ornamental Cabbage and Kale (HIL #507) at http://www.ces.ncsu.edu/depts/hort/floriculture/crop/crop_kale.htm for information on other pests.

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Recommended Reading

Kristl, Ginny. 2001. From 'Sunrise' to 'Sunset': Growing the new cutflower kales. *Cut Flower Quarterly* 13(3):5.

Whipker, Brian E., James L. Gibson, Raymond A. Cloyd, C. Ray Campbell, and Ron Jones. 1998. Success with Ornamental Cabbage and Kale (HIL #507). http://www.ces.ncsu.edu/depts/hort/floriculture/crop/crop_kale.htm.



Figure 6. From left to right, these stems are considered excellent, good, and fair, and the last two are unsalable.